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RESEARCH

Nordic Pharmacy Students' Opinions of their Patient Communication Skills Training

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Objective. To describe Nordic pharmacy students' opinions of their patient communication skills training (PCST), and the association between course leaders' reports of PCST qualities and students' perceptions of their training. Secondary objective was to determine what factors influence these associations.

Methods. A cross-sectional questionnaire-based study was performed. The various curricula were categorized into three types (basic, intermediate and innovative training) and students were divided into three groups according to the type of training they had received. Multivariable logistic regression models were fitted with different opinions as outcomes and three types of training as exposure, using generalized estimation equations.

Results. There were 370 students who responded (response rate: 77%). Students within the innovative group were significantly more likely to agree that they had received sufficient training, and to agree with the assertion that the pharmacy school had contributed to their level of skills compared to students in the basic group.

Conclusion. There appears to be an association between larger and varied programs of training in patient communication skills and positive attitudes toward this training on the part of the students, with students reporting that they received sufficient training, which likely enhanced their skills.

Keywords: patient communication skills training, pharmacy students, Nordic countries

INTRODUCTION

Pharmacists need good patient communication skills to improve patient medication adherence. Only about 50% of patients take their medications as prescribed, and about 40% of Europeans have limited health literacy.[1,2] Good communication between pharmacists and patients is important for efficient patient care that can reduce societal cost and increase patient benefits. Good communication can clarify misunderstandings, prevent incorrect medication usage, and motivate patients to take their medicines.[3-5] However, studies show there is a need for improving patient counseling in pharmacies. Research indicates that often, little time is spent on communication on medicine use, and pharmacists use inadequate communication techniques.[6-9] Furthermore, the International Pharmaceutical Federation's Educational Initiative stresses communication as one of its core competencies for the pharmacy workforce.[10] Pharmacy schools can play an essential role in shaping future pharmacists who can counsel patients well.[11]

A curriculum for communication with patients should include a skills-, attitude- and problem-based approach, clear learning outcomes, a base of theoretical knowledge, emphasis on repeated experiential training, constructive individual feedback, self-reflection and skills assessments.[11] Experiential training methods are active training and can involve role play, video recording, acting or simulated patients. Historically and still in many parts of the world, the education of pharmacists is focused on acquiring basic natural science skills, specialized content knowledge, technical skills, and less on patient care, behavioral sciences and communication skills.[12,13] Pharmacy education is changing in parts of the world.[13-15] Nevertheless, pharmacists and pharmacy employers report a need for an increased focus on clinical training in

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the pharmacy curriculum, including more training in patient communication skills.[16-20] In another study, Nordic course leaders were surveyed on the current training practice and their opinions regarding teaching of patient communication skills in Nordic pharmacy schools.[21] The course leaders reported a need for increased training.

Students can provide invaluable insight on what they find works well, and can give constructive feedback to teachers and curriculum planners for improving communication training.[22] Annual surveys or course evaluations are ways to monitor students' perceptions of the curriculum. Some researchers argue that students' evaluations of teaching can be problematic and misleading, including the measurement of teaching effectiveness.[23] Still, students' evaluations can be useful as part of a 360-degree evaluation in addition to other methods.[23] Several studies have evaluated pharmacy students' opinions on the value of new educational patient communication interventions,[24,25] and how well students are prepared to handle the communications requirements involved in the practice of pharmacy.[26,27] The results of a study of eight pharmacy schools in the United States showed that students whose curriculum included more experiential learning methods felt better prepared to practice counseling with patients.[26] In the United Kingdom, final-year students from 14 different pharmacy schools were surveyed on how well they were prepared for practice in terms of 15 learning outcomes, including communication skills. Significant variation was found among the schools in terms of communication skills training/teaching.[27]

There are no published studies of pharmacy students' overall views and experiences regarding the patient communication skills training (PCST) they received during their undergraduate pharmacy courses. Further understanding and benchmarking are important as differences between perceptions and teaching outcomes may, to some extent, be linked to variations in teaching methods and/or curriculum design, and can help pharmacy educators find new ways of improving and refining teaching in pharmacy schools.[26-28] This study aimed to describe Nordic pharmacy students' opinions of their PCST, and the association between course leaders' reports of PCST qualities (eg, amount of teacher-led training, numbers of experiential training methods) and students' perceptions of their training (eg, sufficient training, improvement of communication ability). The second objective was to determine what factors influence these associations. Nordic countries are Denmark, Finland, Iceland, Norway and Sweden.

METHODS

A cross-sectional questionnaire-based study was performed. All 11 Nordic pharmacy schools (universities) offering 5-year courses leading to a master's degree in pharmacy were invited to participate. Ten accepted the invitation (Figure 1). The questionnaire was presented to the students either at a lecture or by e-mail as an online version depending on what was convenient at each school.[29] The study ran from April 2015 to January 2016. According to Nordic regulations, no ethical approval was required, as the research project was not intended to generate new knowledge about health and disease. Instead the study was reported to and approved by the Data Protection Official at the Norwegian Centre for Research Data (NSD). Ethical considerations were undertaken and data stored confidentially. None of the researchers were involved in data collection of their own students.

The study population was made up of Nordic pharmacy students enrolled in the pharmacy master program. To be included, students must have finished their mandatory PCST at a pharmacy school, and most (60% to 100%) of their six months of pharmacy practical experience (PPE).

Questions and the questionnaire were developed based on the findings of previous studies of important components of health care professionals' patient communication skills curriculum and on appropriate questionnaire design.[11,14,26,30,31] Professionals involved in PCST at Nordic pharmacy schools and a medical school in Norway reviewed the questionnaire for relevance. The questionnaire was then tested on a subset of the target population (21) for completion time, layout, and clarity.[32] This pilot study led to minor changes in the questionnaire. The final questionnaire contained 39 closed questions, two open-ended questions and 12 student characteristic questions (not all questionnaire items are reported here). The questionnaire was in English; this choice was made with the aim of minimizing problems caused by translation or cultural adaptation.[33] It was assumed that Nordic students would have an adequate level of ability in English.[34]

Based on reports from course leaders responsible for mandatory training in each school, PCST was used as an exposure measure.[21] Course leaders were asked to provide information on mandatory courses with an explicit focus on communication with patients and/or other health care professions. All schools had PCST in the PPE course. Information included: teacher-led training (TLT) (including lectures, experiential training, etc.) amount in hours; additional courses containing PCST, besides a PPE (yes/no); number of experiential training methods (eg, role play, video recording, simulated patients); and number of feedback methods the students had been exposed to. A pragmatic approach was undertaken when doing the

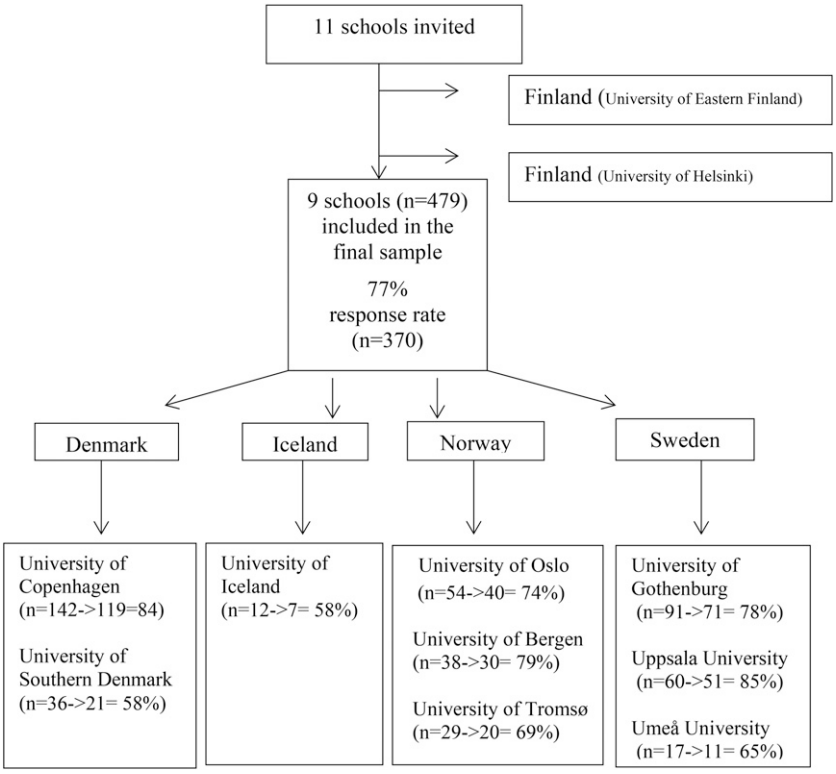

Figure 1. Flowchart Showing the Participating Schools and Final Study Population.

categorization to contrast the different schools' approach to PCST. When grouping the various schools, a clear pattern appeared – schools providing more experiential training also devoted more time, used more feedback methods, etc. (Table 1). The schools were categorized into three groups (basic, intermediate, innovative) according to the number of hours and type of training (experiential training) received as a summary measure of resources invested in and approach toward PCST (Table 1). "Basic" corresponds to training only in the PPE and no experiential training, and "innovative" to having received the most training (> 20 hours, based on Blom and colleagues)[35] and more than 1 experiential training method.

The main outcome measure was students' opinions of their PCST, subdivided into three domains: sufficient PCST, pharmacy school's contribution to patient communication skills, and learning outcome (ie, perceived improvement of ability to communicate with patients) (Appendix 1). Students' opinions of their PCST was measured in terms of nine items, with a 5-point Likert-type response scale (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree). In addition, preferred teaching methods, general comments and ideas on improvements were asked (Appendix 1). For the first and second outcome domains, two scales were created (the third outcome was measured by a single item). An average score was calculated (range 1-5). In the analysis, the three main outcomes were dichotomized (3 ≤ = strongly disagree/disagree/neutral; 3> =agree/strongly agree).

Three main sets of student characteristics potentially associated with both outcome measures and exposure were collected: sociodemographic factors (age, gender, parents' first language and parents working in a health care setting); experience of additional training or patient

Table 1. Categorization of the Exposure Measure into Three Groups

Group	Communication Training During the PPE	Additional Communication Training in Other Courses	Teacher-led Training (hours)	Number of Experimental Training Methods	Number of Feedback Methods
1 (basic)	Yes	No	6-13	0	1
2 (intermediate)	Yes	Yes	12-16	1	2-4
3 (innovative)	Yes	Yes	23-41	2-3	4

contact (participating in extra communication courses, job experience during pharmacy school in a pharmacy and/or health care setting; attitude-related factors (attitudes toward communication skills learning, attitude regarding personality's influence on communication skills and future preferred work setting).[28,36,37] Attitude regarding personality's influence on communication skills was measured via the question "I believe my communication skills are a result of my personality," as it was assumed to be relevant for learning receptiveness.[11,38] Attitudes were measured via a one-dimension scale of a reduced version[39] (17 of 25 items) of the communication skills attitudes scale (CSAS).[40] Data on teachers with formal communication education were collected via a multiple-choice question in the teacher survey.[21] Further categorization of covariates was done as shown in Table 2.

Statistical analyses were performed using SPSS 22.0 for Windows (SPSS Inc., Chicago, IL) and NVivo qualitative data analysis software (QSR International Pty Ltd. Version 10, 2012, Daresbury, UK). Data entry was performed by two people separately and thereafter compared for discrepancies. The open-ended questions were categorized by the first and last author. Descriptive statistics was used in characterization of the sample. Differences between groups of students were tested by Chi-square tests. A value of $p<.05$ (two-way) was considered statistically significant. Cronbach's alpha was calculated for the two scales (the first and second outcome domains).

Univariate and multivariable logistic regression models were fitted with the three main outcomes and the PCST for the three groups as exposure measures, using generalized estimation equations (GEE) for binary outcomes to account for clustering within pharmacy school.[41] Adjustment for the three individual sets of covariates (sociodemographic, receipt of additional training or patient contact, and attitude-related factors) was done in four models. For the final model 4, covariates significantly associated with the outcome or changing the crude odds ratio (OR) +/- 15% were included (extra communication courses were included in all final models) and thereafter, factors were removed from the model if $p>.05$ (the least significant factor was removed first) and if removal of a factor did not change the beta coefficients by more than 15%.[42] Students with a missing value on a student characteristic were excluded from the regression analyses. A test was made to see whether continuous variables were linear in the logit, which resulted in age being dichotomized (≤ 24; ≥ 25). Crude and adjusted ORs are presented with 95% confidence intervals (CI).

A sensitivity analysis was used to test the robustness of the findings by reclassifying students with neutral opinions with those who agreed/strongly agreed. Furthermore, the analyses were restricted to students with complete item response on the outcome measures (sufficient PCST: n=359; pharmacy school's contribution: n=352; learning outcome: n=369). Only students with 100% response rate on the outcome items were included. A sub-analysis further explored the group with the most innovative training (group 3) to explore whether students from the curricula with the highest amount of mandatory communication training (measured in hours) differed within group 3. The group was divided into three subgroups based on course leaders' reported figures (23 hours, 34 hours, 41 hours). Differences between groups were tested by Chi-square tests for the nine items from the three domains. A value of $p<.05$ (two-way) was considered statistically significant.

RESULTS

Of 479 students fulfilling the inclusion criteria, 370 responded (overall response rate: 77%; range 58% to 85%, Figure 1). In the sample, 73.5% were female. The median age was 26, and 56.5% had at least one parent with a Nordic language as their first language and 32.2% of the students came from the University of Copenhagen (Table 2 and Figure 2). Of the students, 67.5% rated their communication skills as good (59.7%) or excellent (7.8%), and the rest as average (28.9%) or poor/very poor (1.9%). There was no significant difference for the three types of training. Experiential teaching methods were more frequently perceived as being effective to teach patient communication skills compared to lectures (Table 3). The internal consistency of domains 1 and 2 were $\alpha=0.76$ and $\alpha=0.75$, respectively.

PPE was the only period of PCST for 70.8% of the students. As shown in Table 4, few students reported having received sufficient training in theoretical knowledge, practical training, feedback on own skills and training to evaluate own skills. In the final multivariable model ($p<.001$), students in the innovative group were significantly more likely to report having received sufficient training compared to students in the basic group (adjusted OR=4.20, 95% CI=2.03 to 8.69), Table 5.

Twenty percent of the students agreed that their communication skills were a result of the training at pharmacy school (Table 4), and 41.1% believed the feedback had significantly improved their communication skills. In the final multivariable model ($p<.001$), students within the innovative group were significantly more likely to report that the pharmacy school had contributed to their skills compared to students in the basic group, (adjusted ORs=3.65, 95 % CI=1.89 to 7.04), Table 5.

Table 2. Characteristics of the Study Population and the Three Exposure Groups (N=370)

Variable	Total sample (N=370) n (%)	Group 1 (N=262) n (%)	Group 2 (N=47) n (%)	Group 3 (N=61) n (%)
Age				
Median	26	26	25	26
Range	24-57	24-46	24-48	24-57
Gender				
Female	272 (73.5)	188 (71.8)	35 (74.5)	49 (80.3)
Male	95 (25.7)	71 (27.1)	12 (25.5)	12 (19.7)
Parents' first language(s)*				
Nordic	209 (56.5)	149 (56.9)	19 (56.8)	41 (68.3)
Non-Nordic	144 (38.9)	100 (38.2)	25 (43.2)	19 (31.7)
Do any of your parents work in a health care setting?				
Yes	104 (28.1)	67 (25.6)	14 (29.8)	23 (37.7)
No	261 (70.5)	190 (72.5)	33 (70.2)	38 (62.3)
Have you taken any extra communication course?				
Yes	40 (10.8)	26 (9.9)	5 (10.6)	9 (14.8)
No	326 (88.1)	232 (88.5)	42 (89.4)	52 (85.2)
Work experience in a pharmacy?***				
Yes	200 (54.1)	98 (37.4)	46 (97.9)	56 (94.9)
No	164 (44.3)	160 (61.1)	1 (2.1)	3 (5.1)
Work experience (eg, patient care in a hospital, etc.?				
Yes	97 (26.2)	63 (24.0)	12 (25.5)	22 (36.7)
No	268 (72.4)	195 (74.4)	35 (74.5)	38 (63.3)
Where would you like to work when you graduate?***				
Only community pharmacy and/or hospital	54 (14.6)	27 (10.3)	13 (28.3)	14 (23.0)
Only pharmaceutical industry and/or university and/or governmental inst.	122 (33.0)	106 (40.5)	10 (21.7)	6 (9.8)
Mixed (both fields)	189 (51.1)	125 (47.7)	23 (50.0)	41 (67.2)
I believe my communication skills are a result of my personality				
Strongly agree/agree	297 (80.3)	214 (82.9)	35 (77.8)	48 (78.7)
Strongly disagree/ disagree/neutral	67 (18.1)	44 (17.1)	10 (22.2)	13 (21.3)
CSAS**	3.67 (0.49)	3.62 (0.49)	3.56 (0.46)	3.97 (0.39)

Group 1=basic, Group 2=intermediate, Group 3=innovative; CSAS= Communication skills attitudes scale. Figures do not add up due to missing data. Missing values under 4% are not shown. Data were missing for (n): language=17. Differences between groups of students were tested by Chi-square tests

*p=<.05

**p=<.01

***p=<.001

In the crude analysis (p=.017), students in the innovative group were significantly more likely to report that learning communication skills had improved their ability to communicate with patients compared to the students in the basic group (crude ORs=3.61, 95 % CI=1.25 to 10.41), Table 5. However, the effect disappeared in the adjusted model (p=.26) when controlling for attitudes.

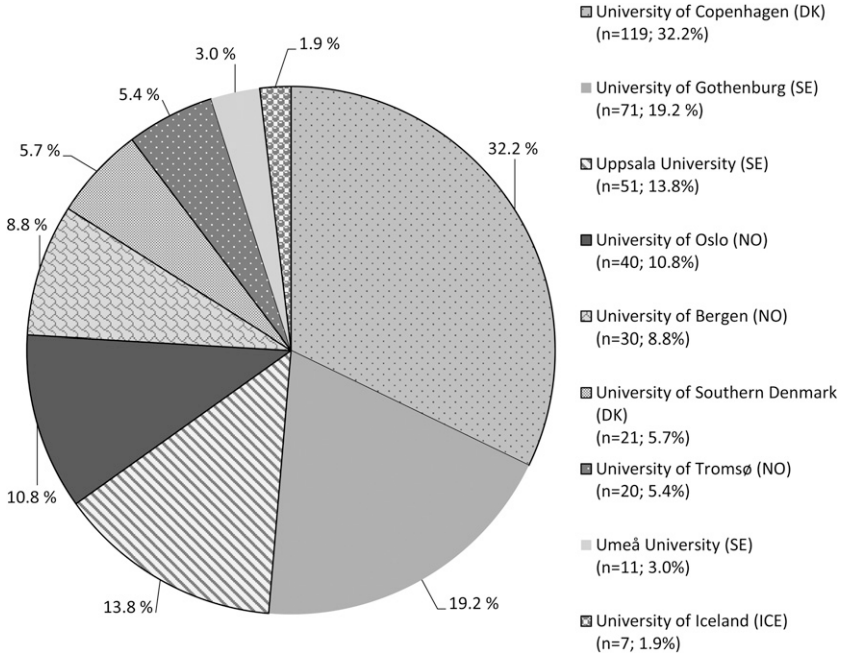

Figure 2. Final Study Population Distribution Among the Partcipating Schools.

Answers to the open-ended questions are described under two categories: frustration and improvements of the PCST. In Appendix 2, quotations exemplify the two categories.

Many students expressed frustration regarding the insufficiency of received patient communication training. This response was more common among students in the two groups who had received fewer than 16 hours of training and less experiential training at a pharmacy school. These students reported that they had received too little or no training at all; that what they had learnt was learnt at other places; that the training had been too basic; that it was just common sense and irrelevant or "fluffy" and that it had not prepared them for communicating with patients. They asked for more feedback on their communication performance. Only students from the innovative group gave concrete examples of how the training had helped them. Nevertheless, students from this group still reported a need for more training. Several students reported that personality was a very important factor in patient communication skills.

Table 3. Students' Opinions on Most Effective Methods to Teach Patient Communication Skills (N=337[a])

Variable	Total Sample (N=337) n (%)	Group 1 (N=241) n (%)	Group 2 (N=41) n (%)	Group 3 (N=55) n (%)
Practice with real patients	242 (71.8)	176 (73.0)	30 (73.2)	36 (65.5)
Observe other practitioners communicate with patients	198 (58.8)	149 (61.8)	22 (53.7)	27 (49.1)
Teacher feedback on my patient meetings	169 (50.1)	121 (50.2)	15 (36.6)	33 (60.0)
Training with other health care professionals	97 (28.8)	63 (26.1)	18 (43.9)	16 (29.1)
Practice with simulated patients	81 (24.0)	53 (22.0)	13 (31.7)	15 (27.3)
Video recording of my patient meetings	64 (19)	47 (19.5)	5 (12.2)	12 (21.8)
Role playing with fellow students	50 (14.8)	33 (13.7)	9 (22.0)	8 (14.5)
Lectures	37 (11.0)	30 (12.4)	0 (0.0)	7 (12.7)
Online communication learning materials	20 (5.9)	14 (5.8)	4 (9.8)	2 (3.6)
Reading books/literature/course material	15 (4.5)	10 (4.1)	1 (2.4)	4 (7.3)
Reflective writing	9 (2.7)	8 (3.3)	0 (0.0)	1 (1.8)
Other	3 (0.9)	1 (0.4)	1 (2.4)	1 (1.8)

Group 1=basic, Group 2=intermediate, Group 3=innovative

[a]A maximum of three options were asked, therefore the totals do not add up; 31 students ticked more than three options (excluded from the analysis); 23 students ticked two or fewer options (included); two students were absent

Table 4. Students' Opinions on the Communication Skills Training Reported for Different Patient Communication Training

Item	Levels	Total Sample (N=370) n (%)	Group 1 (N=262) n (%)	Group 2 (N=47) n (%)	Group 3 (N=61) n (%)
Domain 1: Sufficient patient communication skill training (α=0.76)					
I believe I have received enough theoretical knowledge	Strongly agree/agree	137 (37.0)	92 (35.4)	18 (38.3)	27 (44.3)
	Strongly disagree/ disagree/neutral	231 (62.4)	168 (64.6)	29 (61.7)	34 (55.7)
I believe I have received enough practical training	Strongly agree/agree	127 (34.4)	80 (30.9)	19 (40.4)	28 (45.9)
	Strongly disagree/ disagree/neutral	240 (64.9)	179 (69.1)	28 (59.6)	33 (54.1)
I believe I have received enough feedback	Strongly agree/agree	75 (20.3)	49 (19.0)	8 (17.4)	18 (30.0)
	Strongly disagree/ disagree/neutral	289 (78.1)	209 (81.0)	38 (82.6)	42 (70.0)
I believe I have received enough training to evaluate my own performance	Strongly agree/agree	105 (28.4)	69 (26.7)	13 (28.9)	23 (38.3)
	Strongly disagree/ disagree/neutral	258 (69.7)	189 (73.3)	32 (71.1)	37 (61.7)
Domain 2: Pharmacy school's contribution to patient communication skills (α=0.75)					
I believe the university[a] teaches communication skills that are relevant in a health care setting	Strongly agree/agree	171 (46.2)	117 (45.7)	20 (44.4)	34 (57.6)
	Strongly disagree/ disagree/neutral	189 (51.1)	139 (54.3)	25 (55.6)	25 (42.4)
I believe the teaching methods have significantly improved my communication skills	Strongly agree/agree	119 (32.2)	71 (28.0)	16 (35.6)	32 (54.2)
	Strongly disagree/ disagree/neutral	239 (64.6)	183 (72.0)	29 (64.4)	27 (45.8)
I believe my communication skills are a result of the training at the university	Strongly agree/agree	74 (20.0)	37 (14.3)	6 (13.3)	31 (50.8)
	Strongly disagree/ disagree/neutral	291 (78.6)	222 (85.7)	39 (86.7)	30 (49.2)
Domain 3: Learning outcome (ie, perceived improvement of ability to communicate with patients)					
Learning communication skills has improved my ability to communicate with patients	Strongly agree/agree	301 (81.4)	209 (79.8)	35 (76.1)	57 (93.4)
	Strongly disagree/ disagree/neutral	68 (18.4)	53 (20.2)	11 (23.9)	4 (6.6)

Group 1=basic, Group 2=intermediate, Group 3=innovative

[a]In the Nordic context, the word university is used instead of pharmacy school

Regarding the placement of the training, several students thought that PCST should start from day one. Many wished for a much stronger student activity, focusing on practical training (such as role play, practicing with actors and/or real patients, video recording, self-evaluations and training with other health care professionals) with realistic patient cases, in combination with individual feedback (both at the pharmacy school and during the PPE) rather than passive listening (ie, lectures). A few students suggested a specific patient communication course or a wider range of voluntary courses. They emphasized that the training must be relevant and specific for the pharmacy profession (eg, with teachers with practical/field experiences) and be transferable into real-life practice.

Reclassifying students with neutral opinions to those who agreed/strongly agreed did not change the direction of the ORs (Appendix 3). Similar effect estimates and CIs were obtained when only including cases that had answered all the outcome items (results not shown). In a sub-analysis of the group with the most innovative training, no significant differences were seen (results not shown).

DISCUSSION

The overall results indicate an association between having larger and more varied patient communication

Table 5. Univariate and Adjusted Associations Between Received Patient Communication Training and Students' Opinions

Group	OR_C (CI 95 %)	OR_A Model 1 (CI 95 %)	OR_A Model 2 (CI 95 %)	OR_A Model 3 (CI 95 %)	OR_A Model 4[a,b,c] (CI 95 %)
Domain 1: Sufficient patient communication skills training					
Group 1	ref	ref	ref	ref	ref
Group 2	1.07 (0.55-2.09)	0.99 (0.48-2.05)	0.87 (0.42-1.82)	1.07 (0.52-2.20)	0.61 (0.27-1.34)[a]
Group 3	1.82 (1.03-3.22)*	1.87 (1.05-3.33)*	2.02 (0.99-4.11)	2.38 (1.27-4.45)**	4.20 (2.03-8.69)***[a]
Domain 2: Pharmacy school's contribution to patient communication skills					
Group 1	ref	ref	ref	ref	ref
Group 2	1.16 (0.60-2.26)	0.99 (0.48-2.04)	0.89 (0.42-1.86)	1.03 (0.50-2.09)	0.94 (0.50-2.09)[b]
Group 3	5.45 (2.94-10.11)***	5.91 (3.03-11.51)***	7.26 (3.34-15.78)***	3.56 (1.84-6.86)***	3.65 (1.89-7.04)***[b]
Domain 3: Learning outcome-ie perceived improvement of ability to communicate with patients					
Group 1	ref	ref	ref	ref	ref
Group 2	0.81 (0.38-1.69)	0.62 (0.27-1.39)	0.75 (0.32-1.74)	0.78 (0.34-1.82)	0.74 (0.28-1.99)[c]
Group 3	3.61 (1.25-10.41)*	3.14 (1.07-9.22)*	3.55 (0.91-13.86)	1.85 (0.60-5.69)	1.16 (0.36-3.76)[c]

Ref=reference group. Group 1=Basic, Group 2=Intermediate, Group 3=Innovative; OR_C=crude odds ratio only adjusted for clustering within pharmacy school. OR_A= adjusted odds ratio. *p=<.05, **p<.01 ***p=<.001. Listwise deletion was applied in all regression analysis, if a student missed value on a student characteristic

Model 1= adjustment made for gender, age (dichotomized: ≤ 24; ≥ 25), parents' first language, parents' working in the health care setting

Model 2= adjustment made for extra communication courses, teachers with formal communication education, patient care work in hospitals or in pharmacies

Model 3= adjustment made for attitudes toward communication training (CSAS), impact of the attitude of the role of personality, future preferred work settings

Model 4= adjustment made for:

[a]CSAS, gender, parents' first language, teachers with formal communication education, extra communication courses

[b]Future preferred work settings, attitude regarding personality's influence on communication skills, CSAS, extra communication courses

[c]CSAS, age (dichotomized ≤ 24; ≥ 25), extra communication courses, teachers with formal communication education

training and students' positive attitudes toward this training. This might make students more likely to report having received PCST that enhanced their skills, feeling that the teaching at a pharmacy school had contributed to their skills, that they had received sufficient PCST which prepared them better for practice. The study also shows that patient communication curricula shape students' perceptions differently when it comes to their satisfaction with the training. Similar trends, indicating that differences in impact on communication skills are associated with differences in curricula, were found in studies in the United States and in the United Kingdom.[26,27] Schools with more innovative training were smaller in size and offer newer training programs. One possible explanation can be the demography of teaching staff between schools. For example, newer programs might have a greater proportion of younger teachers who are more eager to introduce new subjects and teaching methods. This could be further explored as a way to help stakeholders in pharmacy education. One possible approach is to use the diffusion of innovation framework in understanding "innovators" more in-depth.[43] The diffusion of innovation framework could be used as a theoretical framework when analyzing differences between "old" and "young" schools. The framework explains how innovations spread or diffuse through society. It differs from other communication theories in that not only does it focus on how receivers get the information and pass it on to others, it also looks at how receivers adopt or reject the innovation. It divides receivers into five groups depending on how fast they adopt innovation: innovators, early adopters, early majority, late majority and laggards.

To obtain good outcomes from a health care professionals' communication curriculum, it is important to have sufficient and varied teaching and training (eg, theoretical knowledge, experiential training, feedback, and self-reflection).[11] The results of this study show room for improvement on most of the components. Few students reported that their communication skills were a result of their pharmacy school training or having received sufficient theoretical or practical communication training. In particular, they expressed a desire for more experiential training. At some schools, there is a discrepancy between how the students described their training and what the course leaders reported. All schools reported providing training in the teacher survey by Svensberg and colleagues, whereas many students from this study were frustrated at not having received any training at all, or only in the PPE.[21] This indicates that students and teachers conceptualize PCST differently. Similarly,

many of the teachers reported a need to expand the teaching of patient communication skills, which is in line with students' opinions in this survey.[21] Further, this study showed that few students thought they had received enough and appropriate feedback. Feedback was mentioned in several of the open-ended questions as highly valuable and students asked for more individual feedback, both at their pharmacy school and during the PPE. Hyvarinen and colleagues reported that 67% of pharmacy students felt that the quality of the feedback from pharmacy preceptors during their PPE was not very good or not mentioned in their reports; which illustrates the need for development in this area (eg, through specialized training of preceptors).[44,45]

Adjustment for attitudes toward communication skills training reduced the magnitude of the association between the training and the pharmacy school's contribution to patient communication skills. This was also the case for the outcome-perceived improvement of ability to communicate with patients toward the null effect, suggesting the role of "attitudes" as intermediator. Educators should focus on students' attitudes toward PCST and PCST importance for their future professional careers, since it could lead to better outcomes of health services and patients. In addition, around 80% of the students reported that they thought their communication skills were a result of their personality. This should be reflected upon and discussed among teachers and addressed in education, since it could be a potential barrier toward learning communication skills (students being less receptive or motivated learners). Research shows that communication skills can be learnt and professional communication is different from participating in a normal conversation.[11]

One strength of this study is that it combines data from two sources, the educators and the students, making it possible to explore the association between different types of training and students' opinions. It is also the first study to explore Nordic pharmacy students' opinions of their overall training. The study draws on extensive data from both sides of the teaching process – the training programs offered by the schools and the students' reported experience of that training. Furthermore, this study described the training exposure not only in terms of numbers of hours, but also in a "quality" assessment (innovative teaching methods). The two domains also showed good internal consistency, with a Cronbach alpha coefficient of 0.76 and 0.75, respectively.

This study has some limitations, which must be considered when interpreting the results. By dichotomizing the outcome measures, the amount of information contained is reduced. This was done as a prior decision due to easier interpretation of odds ratios compared to linear regression coefficients. The possibility that the study included a disproportionate number of student participants with a special interest in PCST cannot be ruled out. However, the response rate was high, though it varied from 58% to 85% between individual schools. For example, results might be less representative of Iceland because the classes there are small and therefore a higher response rate is needed to draw firm conclusions. Also, at some schools, the sample size was small, and it was not possible to detect OR of small magnitude. Students might perceive an implicit pressure (possible consequence of not completing) when completing questionnaires handed out by teachers. This was minimized by excluding the research team in data collection of the students they taught themselves. Data from questionnaires are based on individual recall and attitudes in reporting. Difficulties with recall could have arisen, but most (around 65%) of the students completed the questionnaire in close connection with their final and only PCST training.

The cross-sectional design of the study meant that no causal inferences from the observed relationships can be drawn. Here, longitudinal studies are needed to study the direction of the association between attitudes and innovative training. In addition, students from different pharmacy schools were pooled and then categorized on communication training approaches, without evaluating the quality of teaching in the nine different communication curricula. The study investigators tried to correct this by adjusting for students who had teachers with formal communication education and by using GEE to account for clustering within pharmacy schools. However, the study aim was to explore the impact of different communication training programs (considering their extent in hours and the methods employed) based on students' opinions, not to rank individual schools.

The exposure definition was based on training extent in time and number of experiential training methods, which limited our ability to separate the individual effect of each component on the outcomes of interest. It can be argued, however, that these factors go together: incorporating more experiential training increases the amount in hours (Table 1). Furthermore, there was no data showing how much time was spent on lectures on the one hand, and experiential training, on the other, which could have added useful knowledge to the analysis. To further address what factors and combination of components (role play, lectures etc.) influence opinions and students' level of skills, a randomized control trial or an intervention study is needed. In the Nordic context,

Finnish pharmacy schools have invested substantial resources in, and conducted extensive research on, patient communication teaching and their inclusion would have added valuable insights to the analysis.[21,44,46-48] They were excluded because few responded to the questionnaire. It should be noted that it was the students' own perceptions of patient communication training that were measured, and not their actual behavior, and what methods they thought were effective, and not necessarily what is most effective. There are no formal or agreed methods for assessing how well students are prepared by their training to communicate with patients in the Nordic pharmacy schools, making such comparisons among schools difficult.

CONCLUSION

The results of this study indicate that there is an association between having larger and more varied patient communication training and a positive influence on students' self-reported patient communication skills. Such curriculum design might prepare students better for practice. At some Nordic schools, there is an underutilized potential for the training. Faculties need to recognize students' needs and preferences regarding PCST to improve students' patient communication skills and attitudes. Students' suggestions for improvements of PCST include: extension and restructuring of the training, more use of experiential teaching methods, focus on constructive individual feedback and developing training with outcomes that are transferable into real-life practice. Pharmacists who graduate from such a program can be expected to be well-equipped for communicating with patients and help improve patient medication adherence.

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Appendix 1. Questionnaire Items Assessing Pharmacy Students' Opinions of Patient Communication Skills Training[a]

Domain 1: Sufficient patient communication skills training
I believe I have received enough theoretical knowledge in communication skills
I believe I have received enough practical training in communication skills
I believe I have received enough feedback on my communication skills feedback
I believe I have received enough training to evaluate my own communication performance training in self-evaluation
Domain 2: Pharmacy school's contribution to patient communication skills
I believe the university[b] teaches communication skills that are relevant in a health care setting
I believe the teaching methods significantly improved my communication skills
I believe my communication skills are a result of my training at university[b]
Domain 3: Learning outcome (ie, perceived improvement of ability to communicate with patients)
Learning communication skills has improved my ability to communicate with patients
Additional items:
I believe the feedback significantly improved my communication skills
In your view, what would be the most effective methods to teach communication skills?
Other comments regarding the communication training you had: (open-ended question)
What, if anything, do you think would improve the teaching you had? What would you like to add or change? (open-ended question)

[a]Read the following statements about the communication skills training you had (training to prepare you for communication with patients in a health care setting).When answering, please consider all events that occurred during your pharmacy education, including the 6 months of pharmacy practice experience

[b]In the Nordic context, the word university is used instead of pharmacy school

Appendix 2. Student Quotations Exemplifying the Open-Ended Questions

Frustration

"Communication is, in my opinion. the key in providing a good pharmacist-patient dialog. It is almost as important as our pharmacology knowledge. Therefore, the few lectures/seminars we have at school are not enough! We need more training in understanding and relating to our patients. And we need this training earlier on in the program!" (Respondent 1, from school V, group 1)

"What training we are offered in school and during the PPE is nothing. It doesn't cover anything and doesn't include any training with feedback. The feedback might differ according to place of PPE, but there is no one that follows up on that part from pharmacy school." (Respondent 2, from school X, group 2)

"During the pharmacy program, we have unfortunately not learned anything about communication skills. We've had some oral presentations, but never got any feedback on our communication only about the scientific information." (Respondent 3, from school Y, group 1)

"When starting at the PPE, me and my classmate were stunned at how little we had learned about communication at our school. I have through work and personality (I think) good communication skills and was also told that at the internship, but I see a big lack of the same when talking/seeing classmate who only thinks science when talking to patients with no communication skills at all. I think it is an embarrassment that the school doesn't take it serious. It is not enough to learn about communication theories in 3 days for people which are not use to it. More communication at pharmacy school. It is awkward for the patients and students." (Respondent 4, from school Z, group 1)

Positive experiences with the communication training

"Loved it! It was scary at first, but as we had a lot of practice, it got better. I have had lots of use for it, and find it more fun to work at a pharmacy after the training. Thumbs up!" (Respondent 1, from school A, group 3)

"More practice with patients and more feedback, also when doing the PPE! I think getting feedback from a teacher is a very powerful way of learning." (Respondent 2, from school A, group 3)

Improvements for the communication skills training

"I'd have wished for more communication training - for example, a shorter course. You first realize how important and difficult it is with communication at the PPE-course." (Respondent 5, from school V, group 1)

"All the boxes ticked would be great to have included: Practice with role play, actors, real patients, video of the practice, feedback from teacher and training with other professionals." (Respondent 6, from school X, group 2)

"Less communication theory, more practice. . . And we have to start earlier in our school! Not at the fourth year. Some pharmacies, including mine, were so embarrassed to see some of the students who couldn't communicate." (Respondent 7, from school Z, group 1)

Abbreviations: PPE=pharmacy practical experience

The letter of the pharmacy school has no linkage to the order of schools in Figure 2

Appendix 3. Sensitivity Analysis: Neutral Answer Category Reclassified

Group	OR_C (CI 95 %)	OR_A Model 1 (CI 95 %)	OR_A Model 2 (CI 95 %)	OR_A Model 3 (CI 95 %)	OR_A Model 4[a,b] (CI 95 %)
Domain 1: Sufficient patient communication skills training					
Group 1	ref	ref	ref	ref	ref
Group 2	1.13 (0.60-2.10)	1.16 (0.59-2.30)	0.87 (0.44-1.74)	1.04 (0.54-2.02)	0.77 (0.39-1.50)[a]
Group 3	1.41 (0.81-2.47)	1.51 (0.87-2.63)	1.49 (0.75-2.97)	1.83 (1.00-3.37)*	3.14 (1.54-6.42)**[a]
Domain 2: Pharmacy school's contribution to patient communication skills					
Group 1	ref	ref	ref	ref	ref
Group 2	1.85 (0.97-3.52)	1.56 (0.77-3.15)	1.50 (0.72-3.12)	1.72 (0.85-3.45)	1.52 (0.74-3.10)[b]
Group 3	6.28 (3.05-12.90)***	7.10 (3.41-14.80)***	9.16 (3.85-21.81)***	3.96 (1.83-8.56)***	4.63 (2.21-9.70)***[b]
Domain 3: Learning outcome-perceived improvement of ability to communicate with patients[c]					

Neutrals are grouped with strongly agree/agree. Univariate and adjusted associations between received communication training and students' opinions

Ref= reference group. Group 1=basic, Group 2=intermediate, Group 3=innovative; OR_C=crude odds ratio only adjusted for clustering within pharmacy school. OR_A= adjusted odds ratio. Significant findings are in bold.*p=<.05, **p<.01 ***p=<.001. Listwise deletion was applied in all regression analysis, if a student missed value on a student characteristic

Model 1= adjustment made for gender, age (dichotomized: ≤ 24; ≥ 25), parents' first language, parents' working in the health care setting

Model 2= adjustment made for extra communication courses, teachers with formal communication education, patient care work in hospitals or in pharmacies

Model 3= adjustment made for attitudes toward communication training (CSAS), attitude of the role of personality, future preferred work settings

Model 4= adjustment made for:

[a]Teachers with formal communication education, CSAS, extra communication courses

[b]Gender, future preferred work settings, CSAS, parent's first language extra communication courses

[c]Too few participants to run the analysis